Vertical coordination and standard adoption: evidence from the Costa Rican pineapple sector[1]

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INTRODUCTION

In recent years, global agri-food systems have undergone a rapid transformation towards higher concentration, closer vertical coordination, and more stringent food quality and safety standards (Swinnen and Maertens 2007, Maertens and Swinnen 2009, Reardon et al. 2009). In many developing countries, dualistic domestic markets have evolved with traditional wet markets still handling a large proportion of fresh fruits and vegetables on the one hand, and modern retail chains offering processed but increasingly also fresh produce that is subject to strict quality and food safety regulations on the other hand (Reardon et al. 2003). Similarly, exports from developing countries to the EU or US markets need to comply with increasingly complex food safety regulations (Dolan and Humphrey 2000, Henson et al 2005). This offers both opportunities as well as threats to smallholder farmers in developing countries. Many authors emphasize that participation in these emerging high-value markets can support farmers in upgrading their production systems, and in improving their incomes and overall well-being. On the other hand, stringent requirements that have to be met in order to comply with standards have been perceived as a barrier to participation in high-value markets potentially marginalizing smaller and resource-poor farmers (Reardon et al 2009).

In the past, the definition and implementation of food safety standards was mostly in the domain of public institutions and regulators. Over recent years, there has been a shift towards private standards that define minimum requirements for produce to enter a specific supply chain (Dolan and Humphrey 2000, Maertens and Swinnen 2009). Some of these standards have become quasi-mandatory, such as GlobalGAP, which has been adopted by a large number of retail chains in major EU markets. With a shift in the standard setting authority from public to private, the question arises who will assume responsibility for facilitating farm-level adjustments to the new standard requirements. Public extension services in developing countries often lack the capacities and specialized knowledge to prepare farmers for upgrading and compliance with private standards. This can partly be attributed to the dualistic market structure with low food safety and quality requirements in traditional markets and high requirements in modern domestic and export markets resulting in a food safety and quality gap at the producer level. Public extension services have so far mostly served traditional markets and are usually not equipped to support farmers in overcoming the food safety and quality gap between

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traditional and modern markets. As a response to this, there has been a surge in contract schemes and new institutional arrangements including public-private partnerships that have evolved to provide the necessary support structure to farmers in order to narrow this gap (Kersting and Wollni 2012).

Contract schemes vary from rather informal, trust-based agreements to written contracts that can be legally enforced. Also, the intensity of the vertical coordination varies from case to case. Simple marketing agreements only specify the quantity and time of delivery as well as a fixed or variable pricing scheme. Production contracts involve much closer vertical interaction where buyers may provide inputs or perform specific on-farm tasks during the production cycle. Previous studies have argued that contractual arrangements can help small-scale farmers to participate in and benefit from high-value markets with high standard requirements. Through contract schemes, farmers can benefit from a safe market outlet thus reducing their risk associated with relationship-specific investments. In addition, especially production contracts are often designed to overcome missing markets providing farmers with access to inputs, credit and extension. In this context, contract schemes provide a safeguard to buyers, when providing these services to farmers.

In this paper we investigate the role of formal and informal private-sector contract schemes for farm-level upgrading and performance in high-value chains. In a first step, we analyze the determinants of participation in formal and informal contract schemes. In a second step, we look at the effects of contract schemes on standard adoption. Finally, we investigate whether farmers engaged in contract schemes face better marketing conditions and reduced risk in the supply chain and whether this is reflected in increased net revenues derived from pineapple production. We address these questions in the context of a case study carried out with export-oriented small and medium-scale pineapple farmers in Costa Rica. The Costa Rican pineapple sector represents a typical agricultural high-value chain dominated by vertically integrated international agribusinesses with a strong export orientation, which is increasingly regulated by private standards that set product and process requirements. The paper is structured as follows. In the next chapter we provide some background on the Costa Rican pineapple sector and describe the food standards that are of relevance for the export market. In chapter three we introduce the data and methodology used in the study. Chapter four presents and discusses results and chapter five concludes.

COORDINATION AND GOVERNANCE IN THE COSTA RICAN PINEAPPLE SECTOR

Since the introduction of pineapple as an export crop in Costa Rica, the sector has expanded rapidly (Vagneron et al. 2009), and nowadays Costa Rica is the largest exporter of fresh pineapple in the world. Between 2000 and 2009, pineapple production more than doubled increasing from 0.9 million tons to 1.9 million tons. A major part of the production is destined for the export market, which amounted to 1.5 million tons of pineapples in 2008 (FAO Stat 2011). The main destination markets of Costa Rican pineapple exports are Europe (approx. 52%) and the U.S. (approx. 48%) (CANAPEP 2011). Due to trade agreements, exporters do not incur entry tariffs to access these markets. Both European and U.S. markets, however, are demanding in terms of sanitary and phyto-sanitary standards and public food safety regulations. Furthermore, the importance of private food safety and quality standards has been increasing in these markets over recent years.

The Costa Rican pineapple sector consists of approximately 170 exporters, 72 packing facilities and 1300 producers (CANAPEP 2011). Many exporters are vertically integrated into the processing and production stages, thus disposing of their own packing plants and production units. The majority of the production destined to export markets originates from such vertically integrated production units that

are owned by international and national private firms. Only 5 to 10% of the total export volume is produced by small and medium-scale farmers (MAG 2007; Vagneron 2009). The vast majority of these smallholders, approximately 98%, are located in the Huetar Norte region, where around 50% of the pineapple destined for export markets is grown (MAG 2007, CANAPEP 2011). The other two pineapple growing regions, namely the Atlantic (33% of export production) and the Pacific (17% of export production) regions (CANAPEP 2011), are dominated by large-scale integrated production units. Small-scale farmers deliver their produce either to cooperatives or directly to exporters, who impose strict standards in terms of volumes, product safety and quality (Vagneron et al. 2009).

The most important food safety and quality standard in the Costa Rican pineapple sector is the GlobalGAP standard, a private collective standard developed by the European Retailer Association. The GlobalGAP standard represents a set of rules defining good agricultural practices, especially related to pesticide use and handling of waste. While being a voluntary standard, GlobalGAP is becoming quasi-mandatory in some countries, e.g. the UK and Scandinavia, because major retailers demand it as a prerequisite (Poissot 2003). The main purpose of the GlobalGAP standard is the harmonization and codification of information along the supply chain, i.e. it is used as a coordination mechanism and not as a marketing tool. Therefore it is not associated with a price premium at the consumer level. Still in some cases buyers may pay higher prices for GlobalGAP certified products at the producer level to provide incentives to farmers to comply with GlobalGAP regulations (Kersting and Wollni 2012).

Besides food safety and quality standards, sustainability standards have gained in importance during recent years. In the Costa Rican pineapple sector, organic certification and the Rainforest Alliance standard are of particular relevance. The Rainforest Alliance standard, which was developed by the Sustainable Agriculture Network – a coalition of various environmental NGOs, is a voluntary process standard focusing on sustainable production systems. Certification with this standard entitles farmers to use the Rainforest Alliance label on their products as a marketing tool to inform consumers about the sustainability of their product. Currently markets are still limited and there is no secure price premium, however, farmers might benefit in terms of securing access to a potentially growing market (Giovannucci and Ponte 2005).

Similarly, the organic standard is a voluntary process standard that can be used as a signal to producers who are willing to pay a price premium for organically produced products. The International Federation of Organic Agriculture Movements (IFOAM) has developed basic guidelines that serve as a reference for national and private agencies to develop more specific organic standards. During the past decade, the organic market segment has experienced considerable growth rates in US and EU markets. In response to this, many countries have implemented public standards to regulate the organic sector (Giovannucci and Ponte 2005). Certification with organic standards can be associated with high implementation costs, especially due to long transition periods from conventional to organic production systems. This exposes farmers to major uncertainties regarding future prices of organic produce, given that the price premium is not fixed but depends on market conditions.

To close the gap between the quality and food safety of produce delivered by small and medium scale pineapple growers and the quality and safety requirements of international markets, several exporters have engaged in contracts with growers. The terms of these contracts differ substantially and vary from verbal to written agreements and from marketing to production contracts.

DATA AND METHODS

The analysis is based on original survey data that was collected in two major pineapple production areas in the Huetar Norte region in northern Costa Rica, namely in Pital and Guatuso. Pineapple production has been around in Pital for a long time, whereas it expanded to Guatuso relatively recently. The survey was implemented from November 2010 to January 2011 and included a random sample of 173 households involved in pineapple cultivation. A standardized questionnaire was used to collect data on pineapple production, standard adoption and marketing as well as on socio-economic household variables.

We estimate a bivariate probit model to identify the determinants of participation in verbal and written contracts among pineapple growers in our research area. Furthermore, we apply duration analysis to estimate the effect of vertical coordination on standard adoption. Descriptive statistics including one-way analyses of variance and post-hoc tests are used to compare the marketing conditions of farmers involved in different types of vertical coordination. Finally, we estimate a regression model to analyze the effect of vertical coordination on the net revenue from pineapple production.

RESULTS

In our data set, 32% of the farmers have a verbal agreement and 41% have a written contract with their main buyer. The remaining 27% of the farmers have no agreement prior to selling their fruit.

Participation in formal and informal contracts

Results of the bivariate probit model on contract participation indicates that farmers are more likely to participate in formal contract schemes if they are more educated, if they are member of a pineapple producer organization and if they are member of social organizations (reflecting their willingness to engage in social and group activities). On the other hand, farmers are less likely to participate in formal contract schemes if they have off-farm activities. Farmers, who have access to off-farm income, may not need the support offered by formal contract schemes as they can access credit and information from other sources. Furthermore, the model shows that the more experienced farmers are, the less likely they are to engage in a formal contract. This indicates that farmers with long-term experience in the sector do not depend on the support offered by formal contract schemes. On the other hand, all other factors held constant, the longer the farmer has know the buyer, the more likely they are to engage in a formal contract.

The bivariate model results further show that participation in verbal contracts is more likely among less educated, younger households with a larger number of male adult household members. All other factors held constant, experience in the pineapple sector has a positive effect on the engagement in a verbal contract providing some evidence that farmers may move from formal to informal contracts after gaining some experience in the sector. Land size is not significant in either of the equations indicating that within our sample of small and medium-sized producers we do not find evidence for the exclusion of smaller farmers from formal or informal contract schemes due to their land size.

Relationship between vertical coordination and standard adoption

Next, we address the question whether participation in contract schemes leads to upgrading of the production process. Table 1 shows the relationship between vertical coordination and standard adoption.

Table 1: Vertical coordination and standard adoption

	GlobalGAP	Sustainability*	No standard
Signed contract	82%	34%	14%
Verbal agreement	38%	9%	61%
No agreement	9%	4%	89%

Rows do not sum up to 100% because some farmers have both GlobalGAP and sustainability standards.
* Sustainability standard are here Rainforest Alliance and/or Organic standard

Table 1 shows that of those farmers, who have a signed contract, 82% have adopted GlobalGAP and 34% have adopted a sustainability standard. Contrary to this, 61% of farmers holding a verbal agreement and 89% of farmers holding no agreement have not adopted any standard to upgrade their production process. This simple comparison provides some evidence that a formal contract is a major catalyst for upgrading. Certainly, from this simple comparison one cannot derive whether contracts facilitated standard adoption or whether certified farmers have better access to formal contracts. We investigate this further by applying a duration model to look at the factors influencing standard adoption.

Results of the duration analysis show that participation in both formal and informal contracts has a significant and positive effect on the adoption of standards. Farmers with contracts are significantly more likely to be early adopters, even if we exclude contracts that were formed just one year before adoption. In addition, we find that larger farmers are more likely to be early adopters of standards. The results confirm that contract schemes can act as an important catalyst for farm-level upgrading.

Benefits of participation in contract schemes

While the adoption of a standard can be perceived as a benefit derived from contract participation, the standard itself is only a means to improve market access and revenues of farmers. In the following we compare the marketing conditions of farmers involved in different types of vertical coordination. The comparison provides some evidence on the extent to which contracts help to overcome missing markets and reduce the uncertainties in the supply chain.

Table 2: Relationship characteristics of different forms of vertical coordination

	No agreement (Mean)	Verbal agreement (Mean)	Signed contract (Mean)	
Buyer provides inputs	0	3.6%	1.4%	
Buyer provides credit	9%	21%	55%	***
Buyer provides extension	9%	50%	90%	***
Pineapple rejections (in %)	4.5%	6.7%	11.2%	**
Informed about reason	75%	91%	95%	**
Agreed with reason	57%	73%	62%	
Percentage graded as high quality (grade 5-7)	59%	64%	66%	
Average price received for high-quality fruit (in US$)	0.31	0.30	0.30	
Days to payment according to agreement	16	18	26	***
Days to payment in reality	30	31	53	***
Net revenue from pineapple	7,947	18,085	18,125	

***[**] significant at 1% [5%] probability of error

Descriptive statistics show that while contract farmers on the average have significantly better access to credit and extension through their buyers, they do not benefit in terms of higher quality grades or higher prices. While one would expect that closer vertical coordination lead to the more efficient transmission of relevant information regarding product requirements along the value chain and thereby reduce rejection rates, we find that rejection rates are higher in formal contract schemes. In comparison to farmers without agreement, farmers with verbal or written contract at least seem to be better informed about the reasons for rejection. Finally, contract farmers have to wait significantly longer for their payments. In addition to longer payment periods, farmers with written contracts also suffered from the longest payment delays. The results indicate that major risks such as high rejection rates and long payment delays are not solved, but rather aggravated in formal contract schemes.

Finally, we look at the level of trust and loyalty in vertical relationships. Farmers were asked to rate different statements regarding trust and loyalty with their main buyer on a 5-point Likert scale. Based on these statements three constructs were identified using principal component analysis (see appendix for a description of the constructs). Mean values of each construct for the different types of vertical coordination are presented in Table 3. Results show that farmers engaged in a signed contract display low levels of trust based on past experience, which can be attributed to the long payment delays and high rejection rates. Their low trust levels are comparable to the level of trust among farmers that do not have any agreement. On the other hand, verbal agreements are based on a trustful relationship between farmer and buyer. The loyalty expressed by farmers is highest in the case of signed contracts, which is due to the legally binding character of the written agreement preventing farmers from switching buyers in the short run. Loyalty is lowest in the case of no agreement, where farmers normally choose the buyer offering the best prices at the time of harvest. Finally, those farmers who have a verbal agreement have the highest confidence in the future relationship with their buyer. Although they would switch their buyer if their expectations are not fulfilled, they have built trust based on positive experiences in the past which makes them confident in the future of their marketing

relationship. On the other hand, farmers without agreement do not rely on a stable marketing relationship and therefore display the lowest level of confidence in their future relationship to a particular buyer.

Table 3: Trust and loyalty in vertical relationships

	No agreement	Verbal agreement	Signed contract	
Trust based on past experience	-0.13	0.31	-0.17	*
Loyalty	-0.33	0.04	0.15	*
Lack of confidence in future relationship	0.31	-0.17	-0.04	*

* significant at 10% probability of error

Finally, we estimate the effects of participation in formal and informal contract arrangements on the net revenue from pineapple production. Regression results show that the net revenue derived from pineapple production increases with the length of both formal and informal agreements. Net revenue increases by 1,370 US$/year with an additional year of a formal contract and by 2,218 US$/year with an additional year of a verbal contract, *ceteris paribus*. In addition, we are controlling for factors such as farm size, pineapple price, the percentage of pineapple graded as high quality and the percentage of fruit rejected, which are significant and have the expected signs.

CONCLUSIONS

The study addresses the concern that with a shift from public to private standard setting, public support structures in developing countries will not be sufficient to facilitate farmers` adaptation to the requirements set by private standards. Previous studies have documented the emergence of private contract schemes that aim at filling this gap supporting farm-level adaptation (e.g. Le Coq et al 2010). Most studies focusing on a particular outgrower scheme have been optimistic about the ability of these private-sector initiatives to support small-scale farmers in their upgrading process. In this study, taking into account verbal and written contracts between pineapple producers and several downstream buyers, we find that contracts can act as an important catalyst for standard implementation and that contract farmers derive higher net revenues from pineapple production. Yet, we believe that some caution is warranted given that major uncertainties faced by farmers in the supply chain are not resolved. In order to build sustainable value chains that are beneficial to both farmers and buyers in the long-term, communication and information flows along the supply chain need to be improved. In particular, long payment delays and high rejection rates reduce farmers' trust in the marketing relationship. Anecdotal evidence from the Costa Rican pineapple sector reveals that disadoption rates of standards are high among small and medium-scale producers due to the fact that farmers do not perceive a strong benefit in terms of market access (high rejection rates) or monetary compensation (no price premiums, long payment delays). Further research is needed that looks into the long-term sustainability of private-sector contract schemes and standard adoption.

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APPENDIX

Construct	Cronbach's Alpha	Item	Load
Trust based on past experiences	0.856	I think that my buyer has been trustful during the time I have dealt with him	0.833
		I will not say negative comments about my buyer to my friends and family	0.818
		I would recommend my buyer to my friends and family who also harvest pineapple	0.811
		In general, I think that my buyer has been honest with me	0.737
Loyalty	0.606	If my buyer would lower the price he pays for the product, I would still work with him	0.763
		I would not switch to another buyer even if he offers me a better price for my product	0.743
		As long as I live here and harvest pineapple, I do not feel the need to look for another buyer	0.663
Lack of confidence in future relationships	0.490	I think I have to be careful, when I deal with my buyer	0.870
		I think that I CANNOT trust that my buyer will fulfill his promises	0.694